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Chen

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(54) **CERAMIC VALVE WITH A MIDDLE SECTION HAVING A COLD WATER SUPPLY FUNCTION**

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F16K 11/056	(2006.01)
F16K 31/60	(2006.01)
F16K 11/078	(2006.01)
F16K 11/074	(2006.01)
E03C 1/02	(2006.01)

(52) **U.S. Cl.**

CPC ***E03C 1/041*** (2013.01); ***F16K 11/056*** (2013.01); ***F16K 11/0746*** (2013.01); ***F16K 11/0787*** (2013.01); ***F16K 31/605*** (2013.01); *E03C 2001/026* (2013.01); *Y10T 137/86823* (2015.04)

(58) **Field of Classification Search**

CPC F16K 11/0787; F16K 11/074; F16K 11/0746; F16K 11/02; F16K 11/056; Y10T 137/86823; E03C 1/041

USPC 137/625.17, 625.41

See application file for complete search history.

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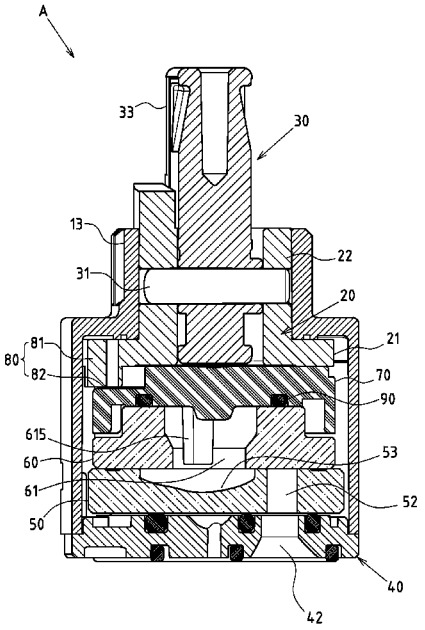
(57) **ABSTRACT**

A ceramic valve includes a casing, a drive seat, a coupling seat, a rotary block and a fixed block sequentially mounted into the casing, wherein a braking shaft is pivotally connected to the drive seat and extends through a top of the casing. A pedestal is sealingly secured on a bottom of the casing for positioning the drive seat, the coupling seat, the rotary block and the fixed block. The rotary block is moved relative to the fixed block to guide cold water into the ceramic valve when the ceramic valve is in a middle section and the braking rod is operated to an inclined status.

5 Claims, 6 Drawing Sheets



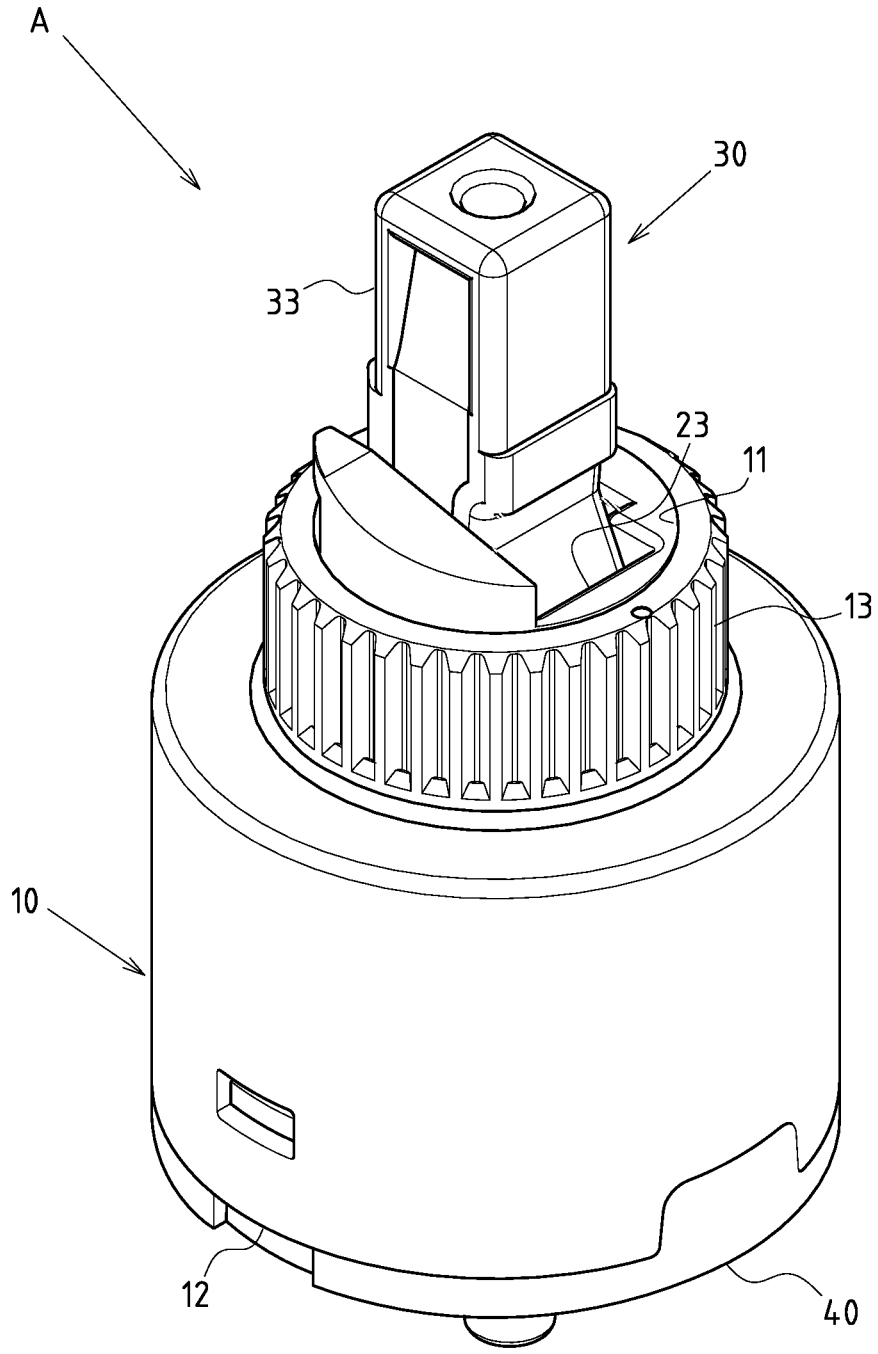


FIG.1

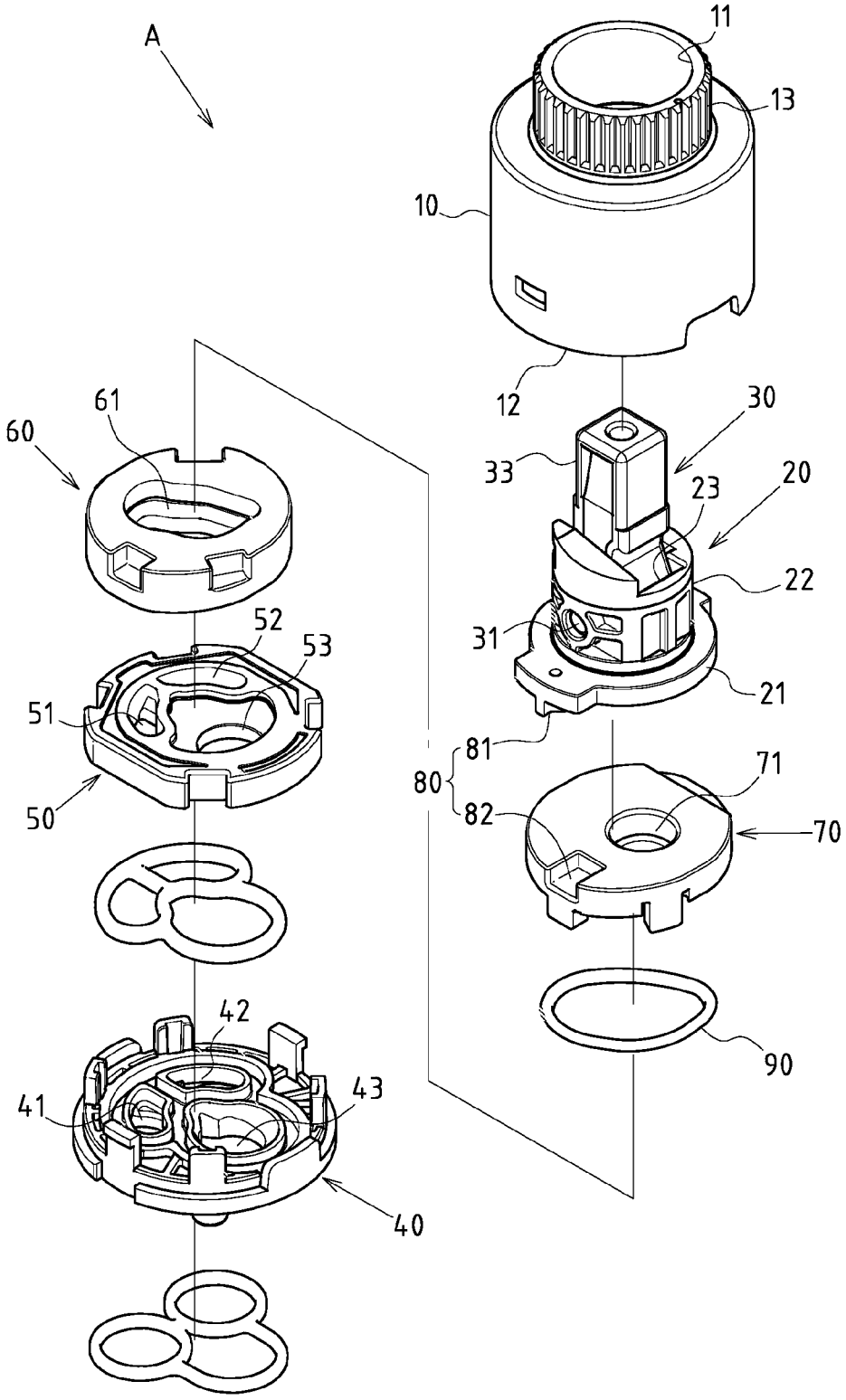

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FIG.2

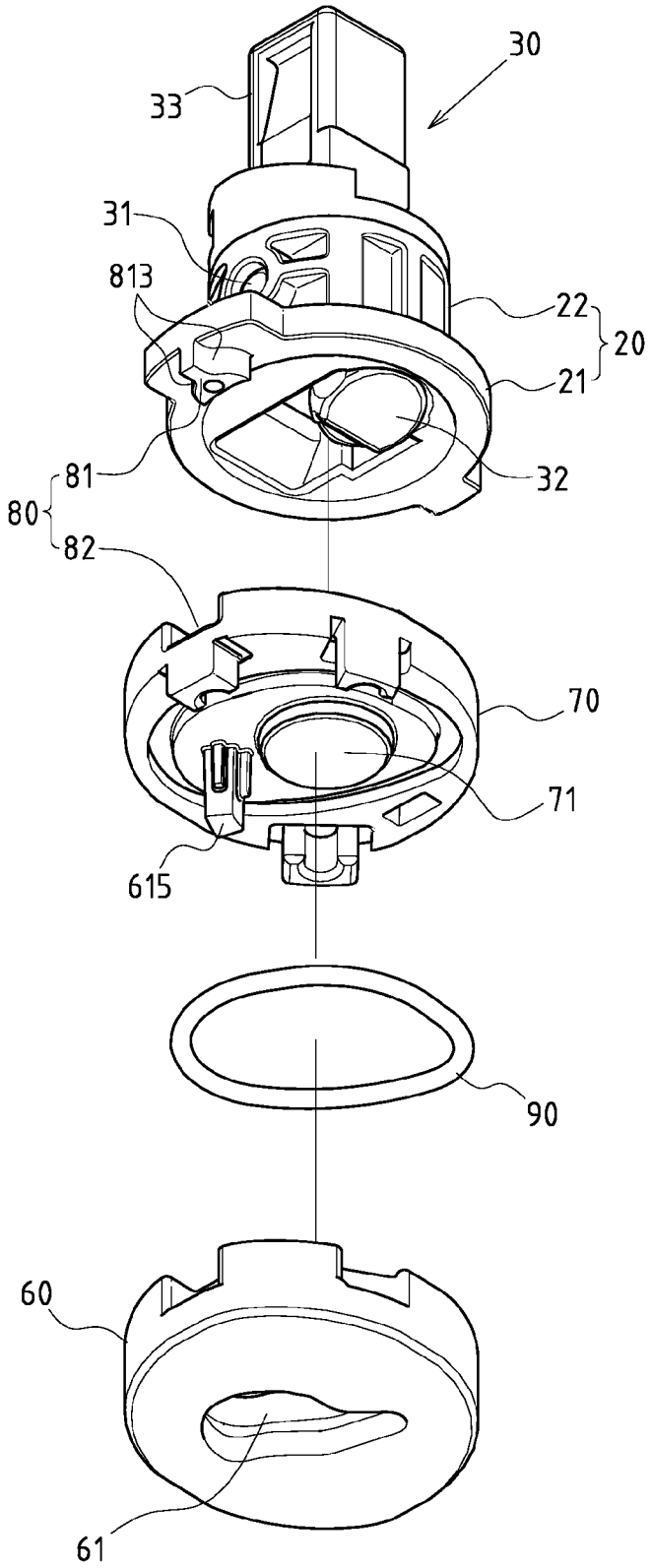

FIG.3

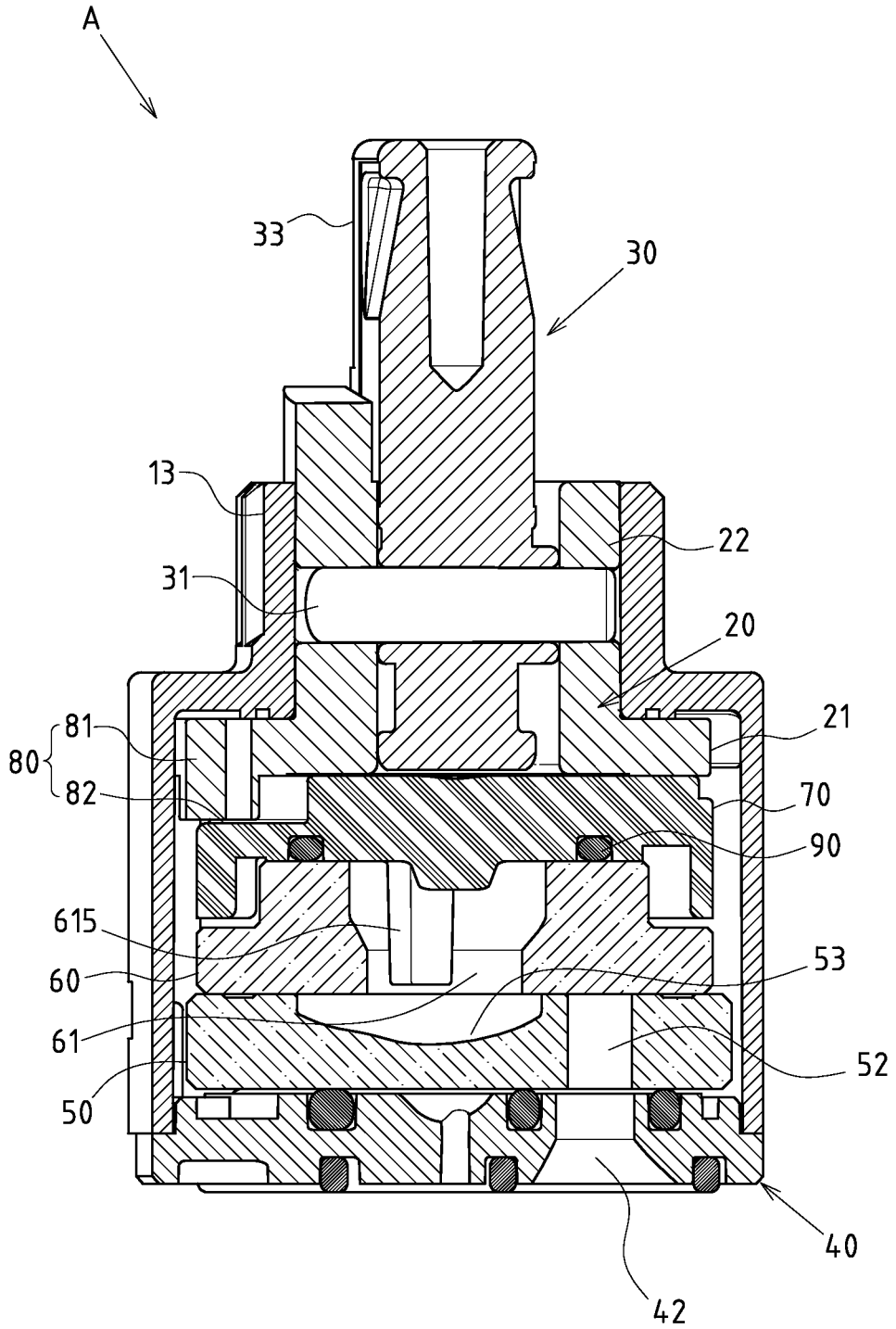

FIG.4

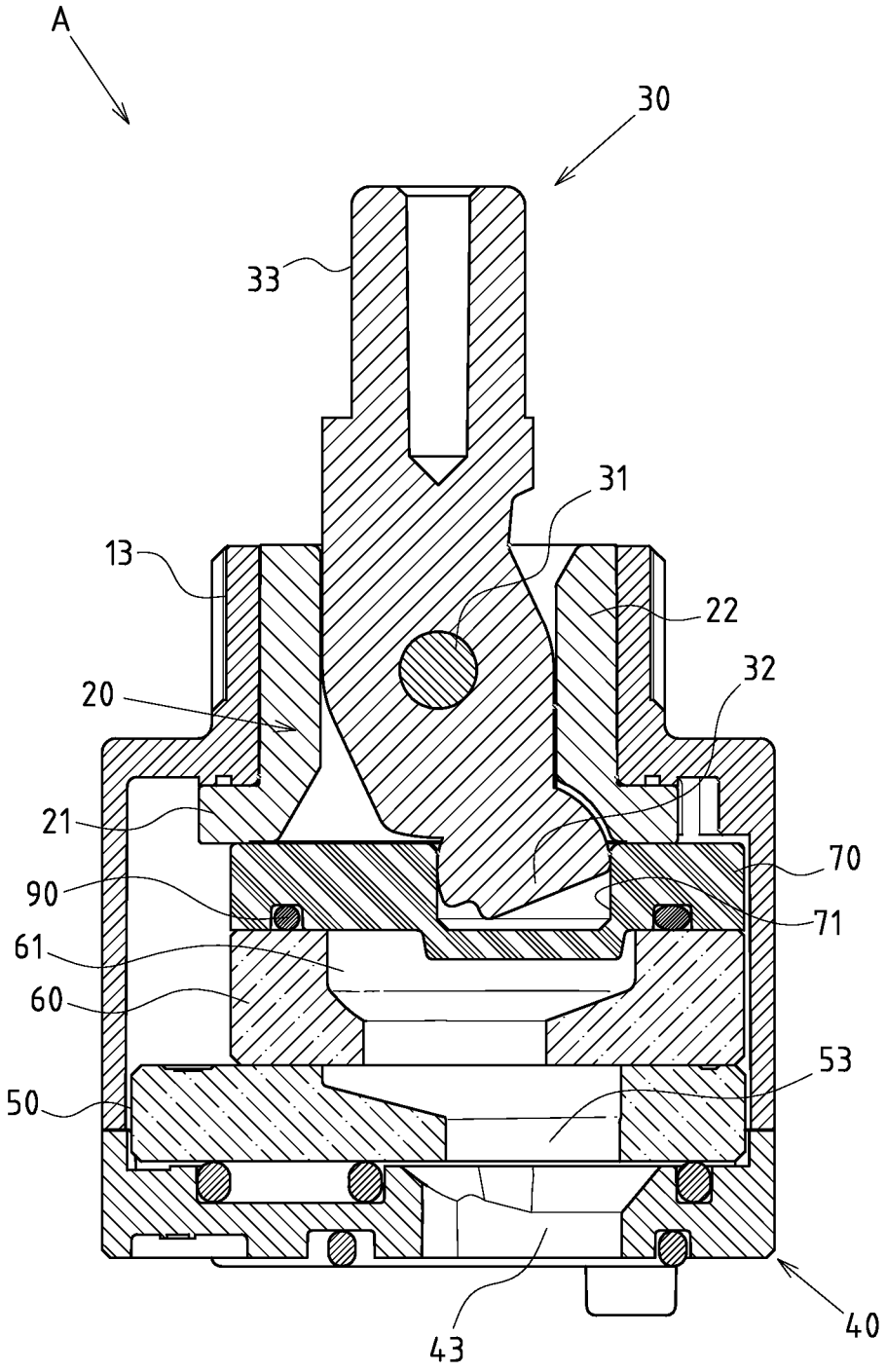

FIG.5

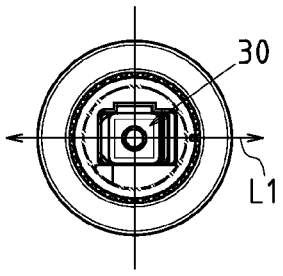

FIG.6

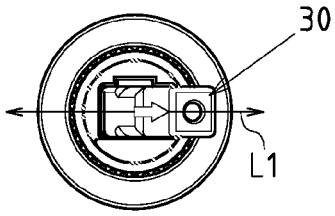

FIG.10

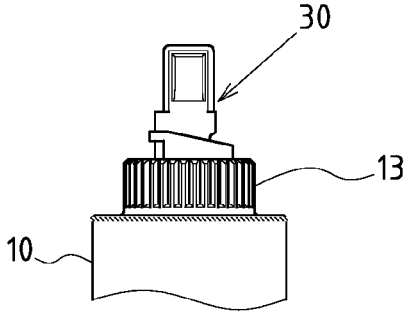

FIG.7

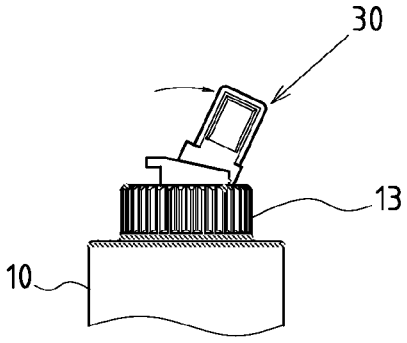

FIG.11

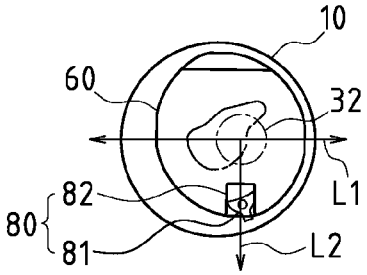

FIG.8

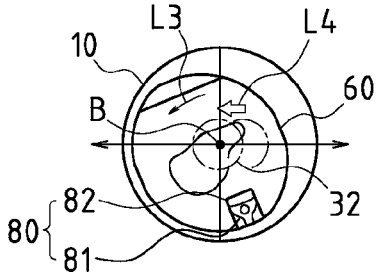

FIG.12

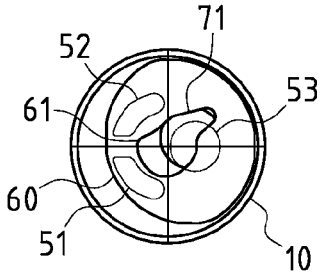

FIG.9

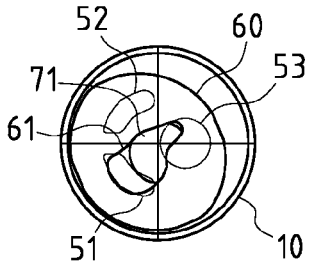

FIG.13

CERAMIC VALVE WITH A MIDDLE SECTION HAVING A COLD WATER SUPPLY FUNCTION

CROSS-REFERENCE TO RELATED U.S. APPLICATIONS

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

NAMES OF PARTIES TO A JOINT RESEARCH AGREEMENT

Not applicable.

REFERENCE TO AN APPENDIX SUBMITTED ON COMPACT DISC

Not applicable.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a ceramic valve, and more particularly to a ceramic valve with a middle section having a cold water supply function.

2. Description of Related Art Including Information Disclosed Under 37 CFR 1.97 and 37 CFR 1.98.

Recently, the operational safety of a cold/hot water faucet (hereinafter referred to as a dual-temperature faucet), especially its anti-scalding function, is of great concern in the industry. For this reason, multiple dual-temperature faucets with anti-scalding function have been developed. For example, a retaining structure is set on the switching path, so the user has to apply a greater force when switching to hot water mode.

In view of the currently available dual-temperature faucet, if the user pulls up the handle already set on the middle section, the preset water supply is in a mixed state, rather than in a cold water state. However, some shortcomings are still observed from the structural design of such a dual-temperature faucet. If cold water supply state is required when the handle of the dual-temperature faucet is pulled up, the user may firstly turn the handle to the ready position for cold water and then pull up the handle properly. Yet, due attentions shall be paid to more scalding possibilities in anti-scalding design. Assuming that the handle is pulled up unintentionally or unwittingly by the user (e.g. children of the elderly) from the middle section, a mixed water state would be expected, but in fact there exist some unstable factors, for example, when water supply pressure at the cold water end is weak, this permits direct switching to hot water mode, leading to scalding hazards. Besides, the swinging angles of warm/hot water modes for the dual-temperature faucet differ very little, this will turn to hot water mode once the user slightly shifts or impinges on it. On the other hand, when the user pulls up the handle from the middle section, since the cold/hot water inlets are partially open, insufficient water pressure makes it impossible to ignite gas for hot water, leading possible to gas leakage.

Furthermore, when the handle of conventional dual-temperature faucet is reset, the user could also reset it to the ready position for cold water, and then pulls up directly for a cold water supply state. To realize the balance of aesthetic effects, most of the user often reset the handle to the middle position after closing the faucet, especially in hotels and guesthouse where quality of service and customer satisfaction are of top priority. Hence, a feasible solution against the aforementioned problems is how to improve the design of the inner ceramic valve structure of a dual-temperature faucet.

Thus, to overcome the aforementioned problems of the prior art, it would be an advancement if the art to provide an improved structure that can significantly improved efficacy.

Therefore, the inventor has provided the present invention of practicability after deliberate design and evaluation based on years of experience in the production, development and design of related products.

BRIEF SUMMARY OF THE INVENTION

The main objective of the present invention is to provide an improved ceramic valve that is formed with a middle section having a cold water supply function.

To achieve the objective, ceramic valve comprises a casing, a drive seat, a coupling seat, a rotary block and a fixed block sequentially mounted into the casing, wherein a braking shaft is pivotally connected to the drive seat and extends through a top of the casing. A pedestal is sealingly secured on a bottom of the casing for positioning the drive seat, the coupling seat, the rotary block and the fixed block. The casing is a hollow structure and has a protrusion extending therefrom, wherein a top opening is defined in a distal end of the protrusion and a bottom opening is defined in the bottom of the casing. The drive seat includes a lower plate and a tubular portion upward extending from the lower plate. The lower plate abuts against a lower end of the protrusion of the casing and the tubular portion is rotatably received in the protrusion. The drive seat includes a cavity centrally defined therein. The braking rod is pivotally connected to the tubular portion of the drive seat by a pin. The braking rod includes a toggle end extending through drive seat and received in the coupling seat, and a trigger formed on a top end of the braking rod, wherein the trigger upwardly extending through the drive seat. The pedestal is secured in the bottom opening and includes a cold water inlet, a hot water inlet and an outlet respectively defined therein, wherein the cold water inlet guides cold water into the ceramic valve, the hot water inlet guides hot water into the ceramic valve and the outlet allows the mixed water flowing out of the ceramic valve. The fixed block is securely and sealingly disposed on the top of the pedestal. The fixed block includes a first through hole, a second through hole and a third through hole respectively defined therein, wherein the first through hole, the second through hole and the third through hole respectively communicate with the cold water inlet, the hot water inlet and the outlet in the pedestal. The rotary block is rotatably disposed on the fixed block. The rotary block includes a tunnel defined therein. The tunnel selectively communicates with the first through hole, the second through hole and the third through hole when the rotary block is rotated relative to the fixed block. The coupling seat is disposed between the rotary block and the lower plate of the drive seat, wherein the coupling seat is synchronously rotated with the rotary block. A trough is defined in the top face of the coupling seat for receiving the toggle end of the braking rod. A biased fulcrum unit is disposed between the drive seat and the coupling seat. The biased fulcrum includes a flanged protrusion downward extending from an edge of the lower plate and an indentation

defined in the top face of the coupling seat, wherein the flanged protrusion is received in the indentation.

The ceramic valve provides cold water when being in the middle section and pulling the braking rod from an upright status to an inclined status and then the tunnel in the rotary block is moved to communicate with the first through hole in the fixed block to achieve the cold water function in the middle section of the ceramic valve in accordance with the present invention, wherein the first through hole communicates with the cold water inlet in the pedestal.

Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. **1** is a perspective view of a ceramic valve with a middle section having a cold water supply function in accordance with the present invention.

FIG. **2** is an exploded perspective view of the ceramic valve in FIG. **1**.

FIG. **3** is an partially exploded perspective view of the ceramic valve in FIG. **1** in another direction.

FIG. **4** is a cross-sectional view of the ceramic valve in FIG. **1**.

FIG. **5** is a cross-sectional view of the ceramic valve in FIG. **1** in another direction.

FIG. **6** is a top plan view of the ceramic valve when the braking rod of the ceramic valve extends along an axis of the ceramic valve.

FIG. **7** is a side plan view of the ceramic valve when the braking rod of the ceramic valve extends along an axis of the ceramic valve.

FIGS. **8** and **9** are operational views of the ceramic valve when the braking rod of the ceramic valve extends along an axis of the ceramic valve.

FIG. **10** is top plan view of the ceramic calve when the braking rod of the ceramic valve is inclined relative to the axis of the ceramic valve.

FIG. **11** is side plan view of the ceramic calve when the braking rod of the ceramic valve is inclined relative to the axis of the ceramic valve.

FIGS. **12** and **13** are operational views of the ceramic valve when the braking rod of the ceramic valve is inclined relative to the axis of the ceramic valve.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and initially to FIGS. **1-5**, a ceramic valve A with a middle having a cold water supply function in accordance with the present invention comprises a casing **10**, a drive seat **20**, a coupling seat **70**, a rotary block **60** and a fixed block **50** sequentially mounted into the casing **10**, wherein a braking shaft **30** is pivotally connected to the drive seat **20** and extends through a top of the casing **10**. A pedestal **40** is sealingly secured on a bottom of the casing **10** for positioning the drive seat **20**, the coupling seat **70**, the rotary block **60** and the fixed block **50**.

The casing **10** is a hollow structure and has a protrusion **13** extending therefrom, wherein a top opening **11** is defined in a distal end of the protrusion **13** and a bottom opening **12** is defined in the bottom of the casing **10**. The drive seat **20** includes a lower plate **21** and a tubular portion **22** upward extending from the lower plate **21**. The lower plate **21** abuts against a lower end of the protrusion **13** of the casing **10** and the tubular portion **22** is rotatably received in the protrusion **13**. The drive seat **21** includes a cavity **23** centrally defined therein.

The braking rod **30** is pivotally connected to the tubular portion **22** of the drive seat **20** by a pin **31**. The braking rod **30** includes a toggle end **32** extending through drive seat **20** and received in the coupling seat **70**, and a trigger **33** formed on a top end of the braking rod **30**, wherein the trigger **33** upwardly extending through the drive seat **20**.

The pedestal **40** is secured in the bottom opening **12** and includes a cold water inlet **41**, a hot water inlet **42** and an outlet **43** respectively defined therein, wherein the cold water inlet **41** guides cold water into the ceramic valve A, the hot water inlet **42** guides hot water into the ceramic valve A and the outlet **43** allows the mixed water flowing out of the ceramic valve A. The fixed block **50** is securely and sealingly disposed on the top of the pedestal **40**. The fixed block **50** includes a first through hole **51**, a second through hole **52** and a third through hole **53** respectively defined therein, wherein the first through hole **51**, the second through hole **52** and the third through hole **53** respectively communicate with the cold water inlet **41**, the hot water inlet **42** and the outlet **43** in the pedestal **40**. The rotary block **60** is rotatably disposed on the fixed block **50**. The rotary block **60** includes a tunnel **61** defined therein. The tunnel **61** selectively communicates with the first through hole **51**, the second through hole **52** and the third through hole **53** when the rotary block **60** is rotated relative to the fixed block **50**.

The coupling seat **70** is disposed between the rotary block **60** and the lower plate **21** of the drive seat **20**, wherein the coupling seat **70** is synchronously rotated with the rotary block **60**. A trough **71** is defined in the top face of the coupling seat **70** for receiving the toggle end **32** of the braking rod **30**.

A biased fulcrum unit **80** is disposed between the drive seat **20** and the coupling seat **70**. The biased fulcrum **80** has a flanged protrusion **81** downward extending from an edge of the lower plate **21** and an indentation **82** defined in the top face of the coupling seat **70**, wherein the flanged protrusion **81** is received in the indentation **82**. With reference to FIGS. **6** and **8**, the line L**2** (as shown in FIG. **8**) of centers of the protrusion **81** and the toggle end **32** is vertical to the motion trail L**1** (as shown in FIGS. **6** and **8**) of the braking rod **30** when the braking rod **30** extends along the axis of the ceramic valve A. In addition, the situation of the biased fulcrum unit **80** corresponds to the first through hole **51** in the fixed block **50**.

With reference to FIGS. **6-8** and **10-12**, the toggle end **32** of the braking rod **30** is moved along a straight line to drive the coupling seat **70** and the rotary block **60** when the braking rod **30** is in the middle section of the ceramic valve A and is operated from an upright status (as shown in FIG. **7**) to an inclined status (as shown in FIG. **11**). Then, the coupling seat **70** and the rotary block **60** is moved along a curved route and the biased fulcrum unit **80** is used a center of the curved route. As result, the tunnel **61** is moved to communicate with the first through hole **61** and the third through hole **53** (as shown in FIG. **13**) for providing cold water when the ceramic valve A in accordance with the present invention is in the middle section.

With reference to FIGS. **6**, **10** and **12**, the toggle end **32** of the braking rod **30** is moved toward the center B of the casing **10** along the direction of the arrow L**4** in FIG. **12** during the braking rod **30** being operated from the upright

status to the inclined status. By such a manner, rotary block **60** has a long curved moving route relative to the biased fulcrum unit **80**.

With reference to FIGS. **2** and **3**, the indentation **82** in the coupling seat **70** is rectangle and the flanged protrusion **81** can be triangle, circle, rectangle or polygonal. In the preferred embodiment of the present invention, the flanged protrusion **81** is triangle and has two inclined portions **813** formed thereon.

With reference to FIGS. **2-4**, the tunnel **61** in the rotary block **60** extends through the rotary block **60** such that an O-ring **90** is sandwiched between the coupling seat **70** and the rotary block **60** for preventing the ceramic valve A from leaking.

With reference to FIGS. **3** and **4**, at least one spoiler **615** extending from a bottom of the coupling seat **70** into the tunnel **61** for preventing noise due to the water current. The penetrated tunnel **61** is provided for easily forming the spoiler **615** because the spoiler of the conventional ceramic valve extends from a bottom of a blind trough in the rotary block **60** that is made of hard ceramics. The spoiler **615** of the present invention extends from the coupling seat **70** that is made of plastic.

As described above, the ceramic valve A in accordance with the present invention can provide cold water when being in the middle section and pulling the braking rod **30** from an upright status to an inclined status and then the tunnel **61** in the rotary block **60** is moved to communicate with the first through hole **51** in the fixed block **50** to achieve the cold water function in the middle section of the ceramic valve A in accordance with the present invention, wherein the first through hole **51** communicates with the cold water inlet **41** in the pedestal **40**.

Although the invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.

I claim:

1. A ceramic valve apparatus comprising:

a hollow casing with a protrusion extending therefrom, said protrusion having a top opening at a distal end of said hollow casing, said hollow casing having a bottom opening at a bottom thereof;

a drive seat having a lower plate with a tubular position extending upwardly therefrom, said lower plate abutting a lower end of said protrusion, said tubular protrusion rotatably received in said protrusion, said drive seat having a cavity in a center thereof;

a braking rod pivotally connected by a pin to said tubular portion of said drives seat, said braking rod having a toggle and extending through said drive seat, said braking rod having a trigger formed at a top end thereof, said trigger extending upwardly through said drive seat;

a coupling seat receiving said toggle end of said braking rod;

a pedestal secured in said bottom opening of said hollow casing, said pedestal having a cold water inlet and a hot water inlet and an outlet, said cold water inlet adapted to guide cold water into the ceramic valve apparatus, said hot water inlet adapted to guide hot water into the ceramic valve apparatus, said outlet adapted to allow a mixture of the hot and cold water to flow outwardly of the ceramic valve apparatus;

a fixed block securely and sealingly disposed on a top of said pedestal, said fixed block having a first through hole communicating with said cold water inlet and a second through hole communicating with said hot water inlet and a third through hole communicating with said outlet;

a rotary block rotatably disposed on said fixed block, said rotary block having a tunnel defined therein, said tunnel selectively communicating with said first through hole and said second through hole and said third through hole when said rotary block is rotated relative to said fixed block;

a coupling seat disposed between said rotating block and said lower plate of said drive seat, said coupling seat synchronously rotating with the rotary of said rotary block, said coupling seat having a trough defined in a top face thereof, said trough receiving said toggle end of said braking rod, said coupling unit having an indentation in a top face thereof; and

a fulcrum unit having a flanged protrusion extending downwardly therefrom from an edge thereof, said flanged protrusion being received in said indentation of said coupling seat.

2. The ceramic valve apparatus of claim **1**, said braking rod being movable from an upright orientation to an inclined orientation.

3. The ceramic valve apparatus of claim **2**, said indentation of said coupling seat being rectangular, said flanged protrusion being a shaped selected from the group consisting of a triangle, a circle, a rectangle, and a polygon.

4. The ceramic valve of claim **3**, said tunnel of said rotary block extending entirely therethrough, the ceramic valve apparatus further comprising:

an O-ring sandwiched between said coupling seat and said rotary block.

5. The ceramic valve apparatus of claim **4**, further comprising:

at least one spoiler extending from a bottom of said coupling seat into said tunnel.

* * * * *